

CLAIMS

- 1 A combustion chamber for a gas turbine engine comprising at least one Helmholtz resonator having a resonator cavity and a damping tube in flow communication with the interior of the combustion chamber, the tube having at least one cooling hole extending through the wall thereof.
- 2 A combustion chamber as claimed in Claim 1 wherein a plurality of cooling holes are provided in the wall of the tube.
- 3 A combustion chamber as claimed in Claim 2 wherein the holes are circumferentially spaced in at least one row extending around the circumference of the tube
- 4 A combustion chamber as claimed in Claim 3 comprising a plurality of axially spaced circumferential rows of cooling holes
- 5 A combustion chamber as claimed in any of Claims 2 to 4 wherein the holes are angled with respect to the longitudinal axis of the tube.
- 6 A combustion chamber as claimed in Claim 5 wherein the holes are angled in a direction towards the combustion chamber end of the tube such that the respective axes of the holes converge in the direction of the combustion chamber.
- 7 A combustion chamber as claimed in Claim 6 wherein the angle of the holes with respect to the longitudinal axis of the tube is substantially in the range of 20 to 40 degrees.
- 8 A combustion chamber as claimed in Claim 7 where the said angle is substantially 30 degrees.

- 9 A combustion chamber as claimed in any of Claims 2 to 8 wherein the said holes are angled with respect to the tube circumference.
- 10 A combustion chamber as claimed in Claim 9 wherein the holes have a tangential component substantially in the range of 30 to 60 degrees with respect to the tube circumference.
- 11 A combustion chamber as claimed in Claim 10 wherein the angle of the holes with respect to the tube circumference is substantially 45 degrees.
- 12 A Helmholtz resonator for a gas turbine engine combustion chamber; the said resonator having a resonator cavity and a damping tube for flow communication with the interior of the combustion chamber, the tube having at least one cooling hole extending through the wall thereof.
- 13 A combustion chamber for a gas turbine engine comprising at least one Helmholtz resonator having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said at least one resonator being supported with respect to the combustion chamber independently of the combustion chamber.
- 14 A gas turbine engine combustion section including a combustion chamber, a combustion chamber inner casing and a combustion chamber outer casing; the said combustion chamber comprising at least one Helmholtz resonator having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said at least one resonator being supported with respect to the combustion chamber independently of the combustion chamber by the said combustion chamber inner casing or the said outer casing.
- 15 A combustion section as claimed in Claim 14 wherein the said at least one resonator is/are supported by the said outer casing with the said resonator(s)

positioned on the radially outer side of the combustion chamber or supported by the said inner casing with the said resonator(s) positioned on the radially inner side of the combustion chamber.

- 16 A combustion section as claimed in Claim 14 or Claim 15 wherein the said at least one resonator is/are supported by the said inner casing with the said resonator(s) positioned on the radially inner side of the combustion chamber and enclosed within a cavity provided between the said inner casing and a windage shield on a radially inner side of the said casing.
- 17 A gas turbine engine combustion section including a combustion chamber and at least a combustion chamber inner casing; the said combustion chamber comprising at least one Helmholtz resonator having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said at least one resonator being at least partially enclosed within a cavity provided between the said inner casing and a windage shield on a radially inner side of the said casing.
- 18 A combustion section as claimed in Claim 17 wherein the said combustor comprises a plurality of resonators, each enclosed within the said cavity provided by the said windage shield.
- 19 A combustion section as claimed in Claim 18 wherein the said plurality of resonators are circumferentially spaced around the combustion chamber.
- 20 A combustion chamber for a gas turbine engine comprising a plurality of Helmholtz resonators each having a cavity and a damping tube in flow communication with the interior of the combustion chamber, the said resonators being circumferentially spaced around the combustion chamber with the respective cavities of diametrically opposed resonators having substantially different volumes.

- 21 A combustion chamber as claimed in Claim 20 wherein the said resonators are circumferentially spaced around the combustion chamber with the cavities of respective resonators having successively smaller volumes.
- 22 A combustion chamber for a gas turbine engine comprising at least one Helmholtz resonator having a resonator cavity and a damping tube in flow communication with the interior of the combustion chamber, the said cavity having substantially similar principle dimensions.
- 23 A combustion chamber as claimed in Claim 22 wherein the said cavity has a substantially spherical or cubic shape.
- 24 A combustion chamber for a gas turbine engine of the type having a plurality of heat shield type tiles lining the interior surface of the combustion chamber; the combustion chamber comprising at least one Helmholtz resonator having a cavity and a damping tube in flow communication with the interior of the combustion chamber with the tube having an opening in the interior of the combustion chamber substantially flush with the interior surface of the tiled lining.
- 25 A combustion chamber substantially as hereinbefore described and/or with reference to the accompanying drawings.
- 26 A gas turbine engine combustion section substantially as hereinbefore described and/or with reference to the accompanying drawings.